PHENIX's view on operation

RHIC retreat version

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Run-11 PHENIX Run Coordinator

Run-11 PHENIX detector

Central Arms:
- **hadrons, photons, electrons**
- **$|\eta| < 0.35$**
- **$\Delta\varphi = \pi$ (2 arms x $\pi/2$)**

Global Detectors:
- **Beam-Beam Co**
- **Zero Degree Ca**

Muon Arms:
- **muons**
- **$1.2 < |\eta| < 2.2$**
- **$\Delta\varphi = 2\pi$**

MPC 3.1 < | η |

Both are successfully commissioned this year

Major goals of this run

- W-boson measurement through muon decay in 500GeV p+p
  Triggering high pT muons from W bosons
  - Commissioning of Muon Trigger system
    - MuTrig electronics, RPC commissioning

- Separation of electrons from b/c quarks by looking at DCA in 200GeV Au+Au
  - Commissioning of VTX detector

•Why this run was different from last year?
  •New system installation, commissioning and machine development
  •Commissioning of new detectors were performed during 500GeV p+p

Summary of integrated luminosity

Collision System	Luminosity Goal	Achieved Luminosity	Percentage
500 GeV p+p	50 pb^{-1} (20)	16.7 pb^{-1}	33 % (84 %)
19.6 GeV Au+Au	20 M	13 M	~100 %
200 GeV Au+Au	700 μb^{-1}	788 μb^{-1}	113 %
27 GeV Au+Au	5.2 μb^{-1}	7.4 μb^{-1}	140 %

Polarization of p+p beam: 50 % (goal), 45 % (achieved)

Summary as we think for this run

- 500GeV p+p (Feb 27 - Apr 18)
  - Suffered from background, many failures, and short of statistics
  - Also, the polarization was low. We needed more.
  - Many developing items, uncertain budget conditions, and challenging operation of the machine
- 19.6GeV Au+Au (Apr 19 - May 2)
  - Very good beam quality. Wide vertex distribution was only problem
- 200GeV Au+Au (May 6 - Jun 20)
  - Very good beam quality. Enough Statistics
- 27GeV Au+Au (Jun 21 - Jun 29)
  - Very good beam quality. Wide vertex distribution was only problem

Characteristic numbers for recorded luminosities

- PHENIX Uptime
  - 200GeV Au+Au: 71%
  - 500GeV p+p: 62%
- Uptime here includes losses from:
  1. Polarization measurements and vernier scans
  2. AnDY insertions
  3. Zero field and other calibrations
  4. PHENIX loses
     - HV on/off, run start/stop
     - detector problems

PHENIX Efficiencies	500 GeV p+p	200 GeV Au+Au
Livetime	91%	92%
30 cm vertex	61%	48%
12 cm vertex	35%	27%
Uptime	62%	71%

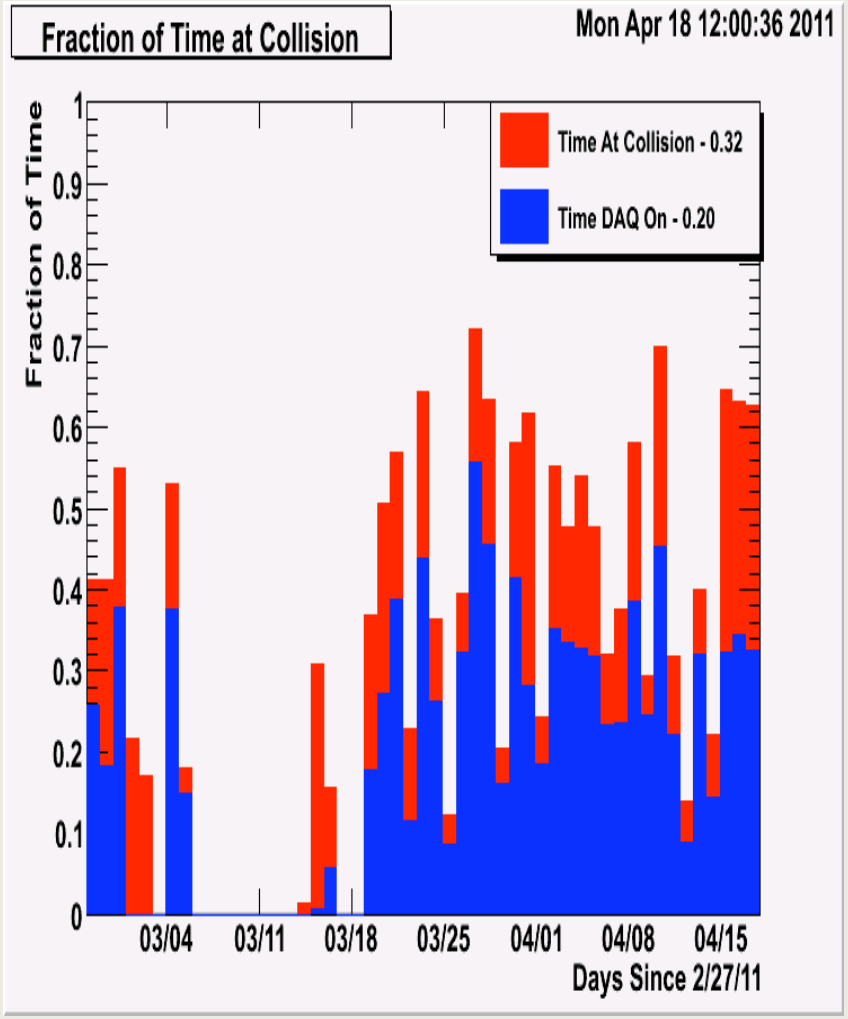
1-3 are not truly loss from the point of view of physics

Questions to be addressed

- What is the most vulnerable part in your system?
  - Beam background which causes massive trips in forward detectors (RPC, Muon tracker)
  - Splash of the beam from collimeters,
  - Polarization measurement and AnDY insertion.
- What should we do about it?
  - Place more shield around Q3 magnet and around detectors (for stopping beam splash)
- What is the next potential vulnerable part of your system and how should we be prepared to avoid it?
  - Timing glitches between fills. If the clock timing changes, we have to resync most of the detector systems. It takes time.

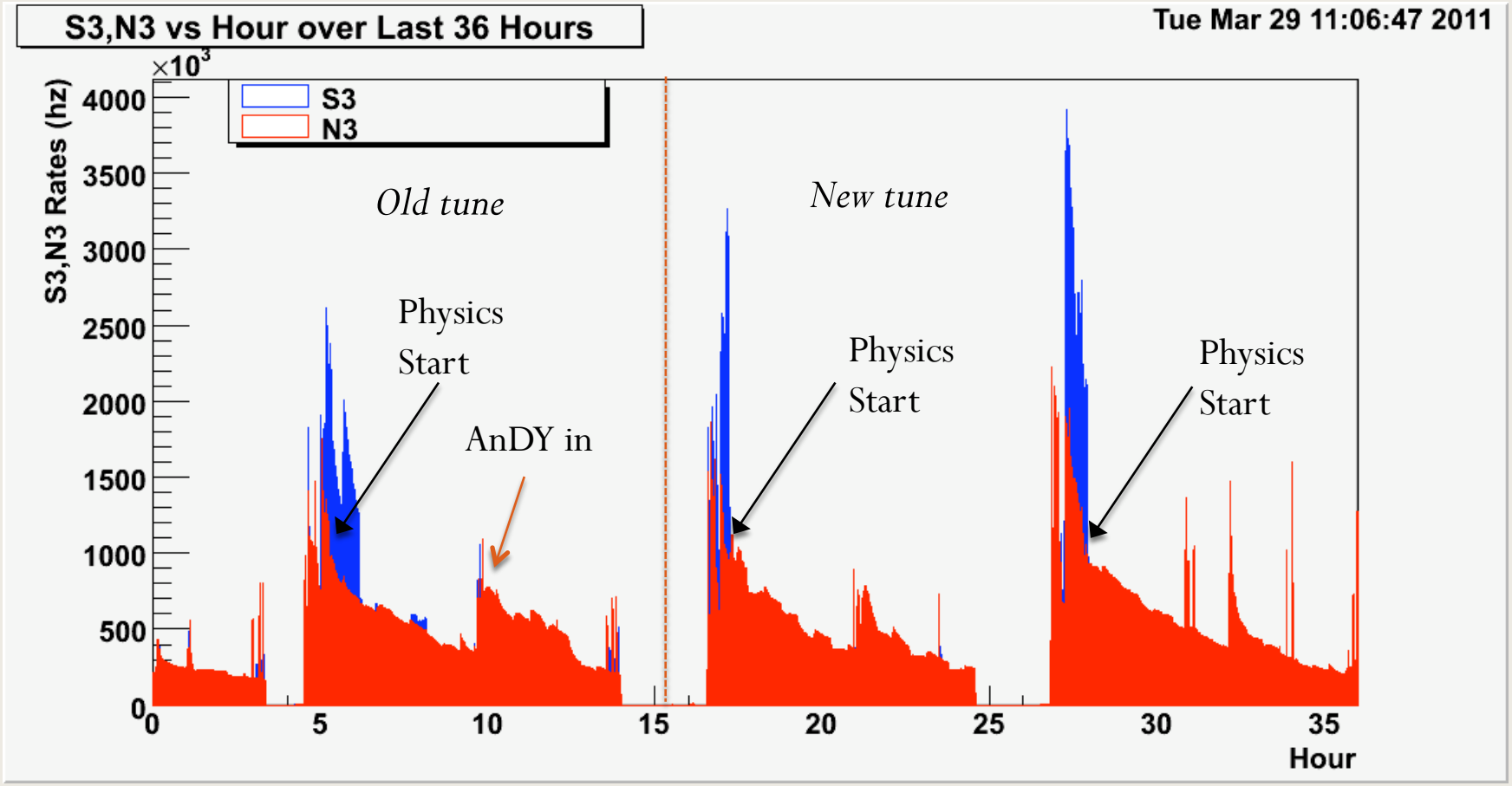
Fraction of time at collisions in p+p

- ~ 5 min before and after polarization measurement (~ 20 min) was dead time for us
  - In order to avoid sudden increase of background
- AnDY insertion caused another dead time (~ 15 min)
  - It is much better when AnDY and polarization measurement are done at same time
- Three polarization measurement and AnDY bringing in resulting in ~ 2 hours,
  - Typical store length was 8 hours



Beam background end of March

- Background monitor in south(S3) and north(N3) tunnels

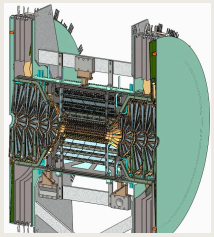


Operational request

- Go on as scheduled even budget situation is uncertain
  - We basically changed plan for the run every week.
  - It should maximally be avoided. In the end, this makes inefficient use of the machine.
- No machine development including luminosity/polarization change before and on the weekend.
- Granting short access to tunnels/IR is beneficial to experiments
  - Most of the time, sooner, the better. Is there any way to make efficient switching between access/beam efficiently? This year, the PASS system problem hurt us a lot.
- Time sharing of the machine is good.
  - eg. Mon MD, Tue Exp, Wed Maintenance, Thu MD/APEX, Fri-Sun Exp.

Upcoming upgrades next year

- RPC1 full installation (resistive chamber for muon detection)
  - Background reduction for W measurement
- FVTX (forward region silicon vertex detector)
  - c/b separation in forward region
- Both will be commissioned during p+p running



Forward Silicon Vertex Detector

Detector Assembly

Assembly: 96 small, 288 large silicon wedges mostly complete

14 out of 16 silicon disk assemblies completed

Assembly of disks into four half-cages about to begin

Readout System

Boards prototyped, production cards received or in procurement

All design specifications met!

Mechanics

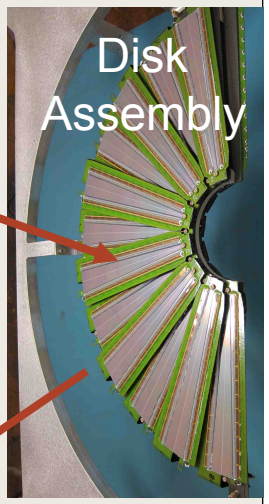
All detector mechanical structures completed

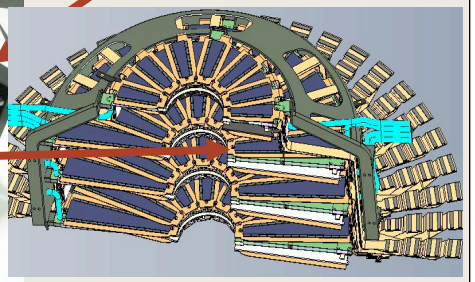
Schedule

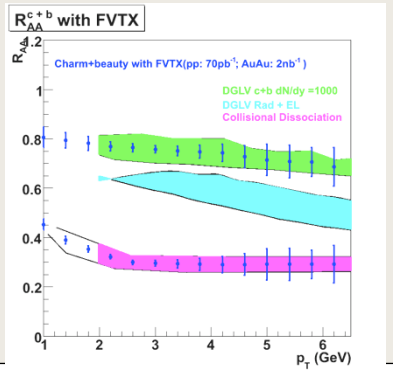
Detector assembly expected complete by August

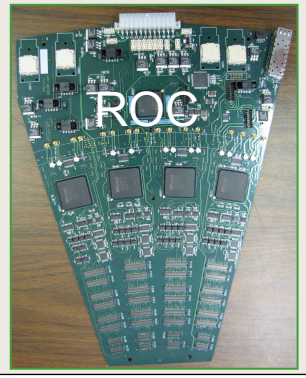
Integrate FVTX and VTX & install into PHENIX

Data collection in Run 12









Summary

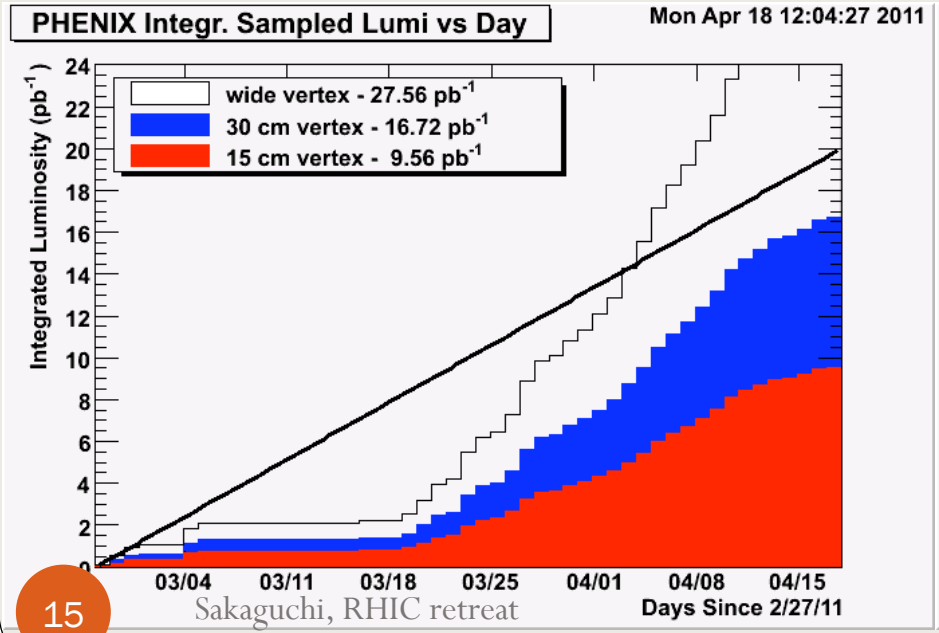
- Au+Au part of the run was fairly stable, and good
- 500GeV p+p was challenging in many sense.

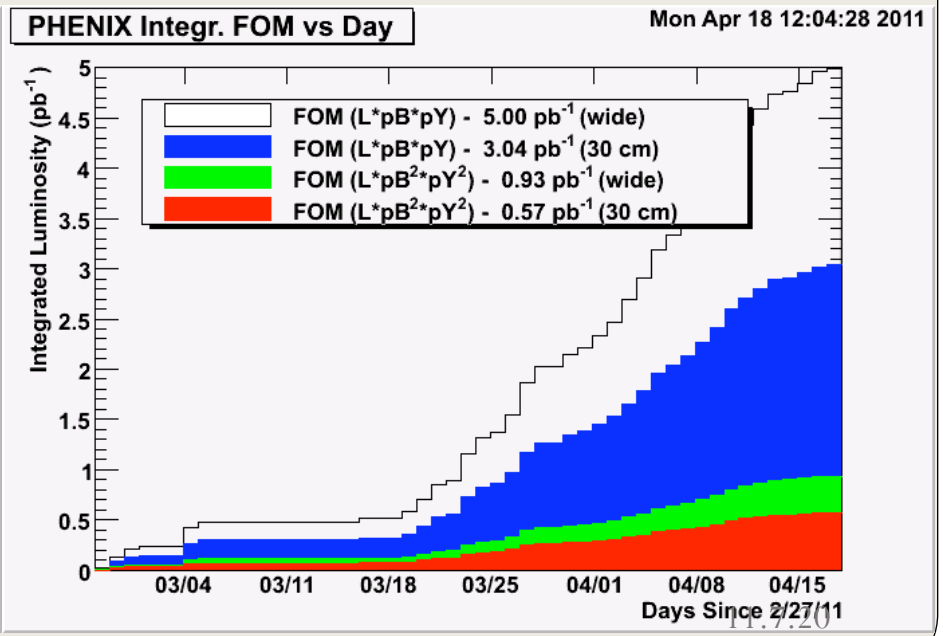
We thank you a lot, all of the C-AD people, for the hard effort during the run!

Backup

Final stats for Run-11 P+P running

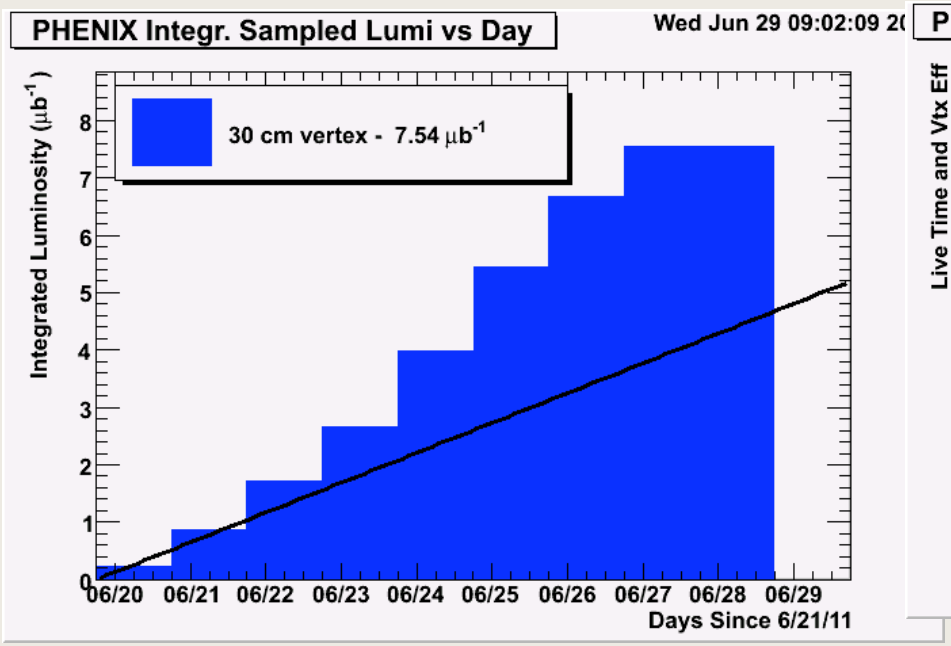
- Original goal for Run11: L=50pb^{-1} with P=50%
- Reduced goal after cryo failure: L=20pb^{-1}
- Achieved: L=16.7pb^{-1} with P=45% (online)
  - 1/3 of original luminosity goal, 84% of reduced goal
  - Final figure of merit achieved will wait for more firm P value

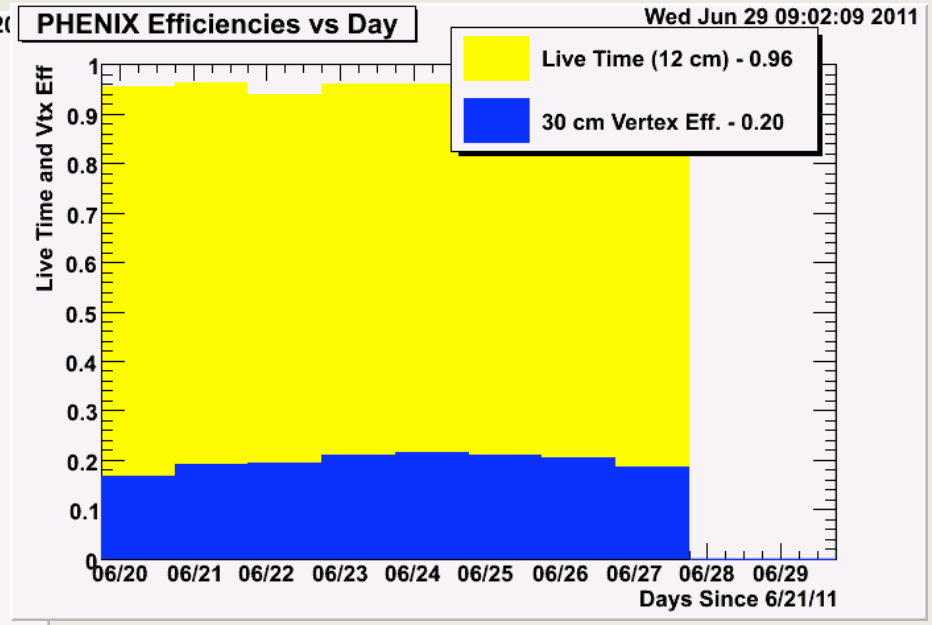




27GeV Final statistics

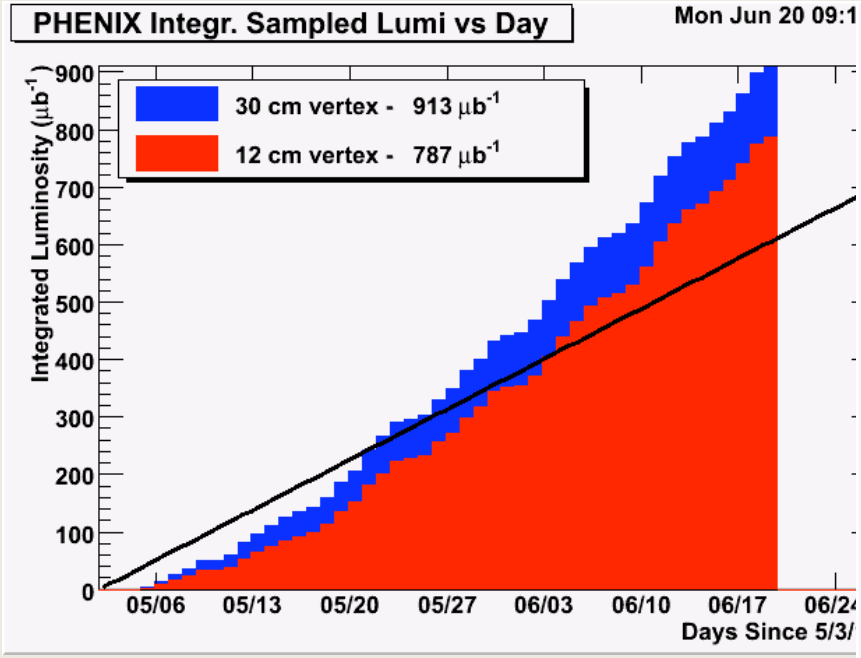
- Vertex distribution is very wide.

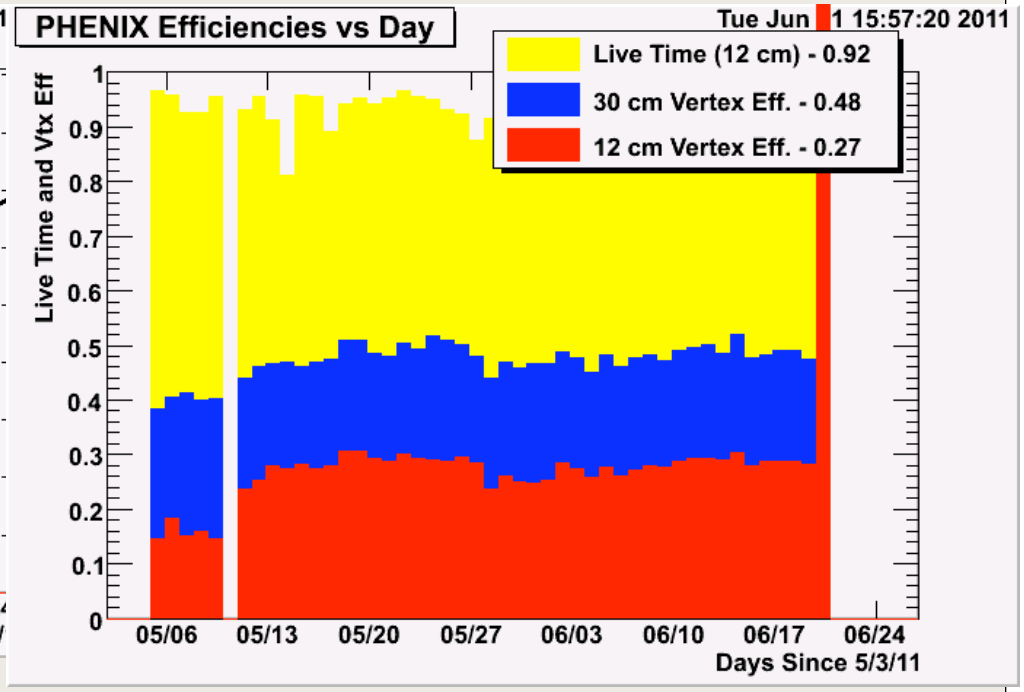




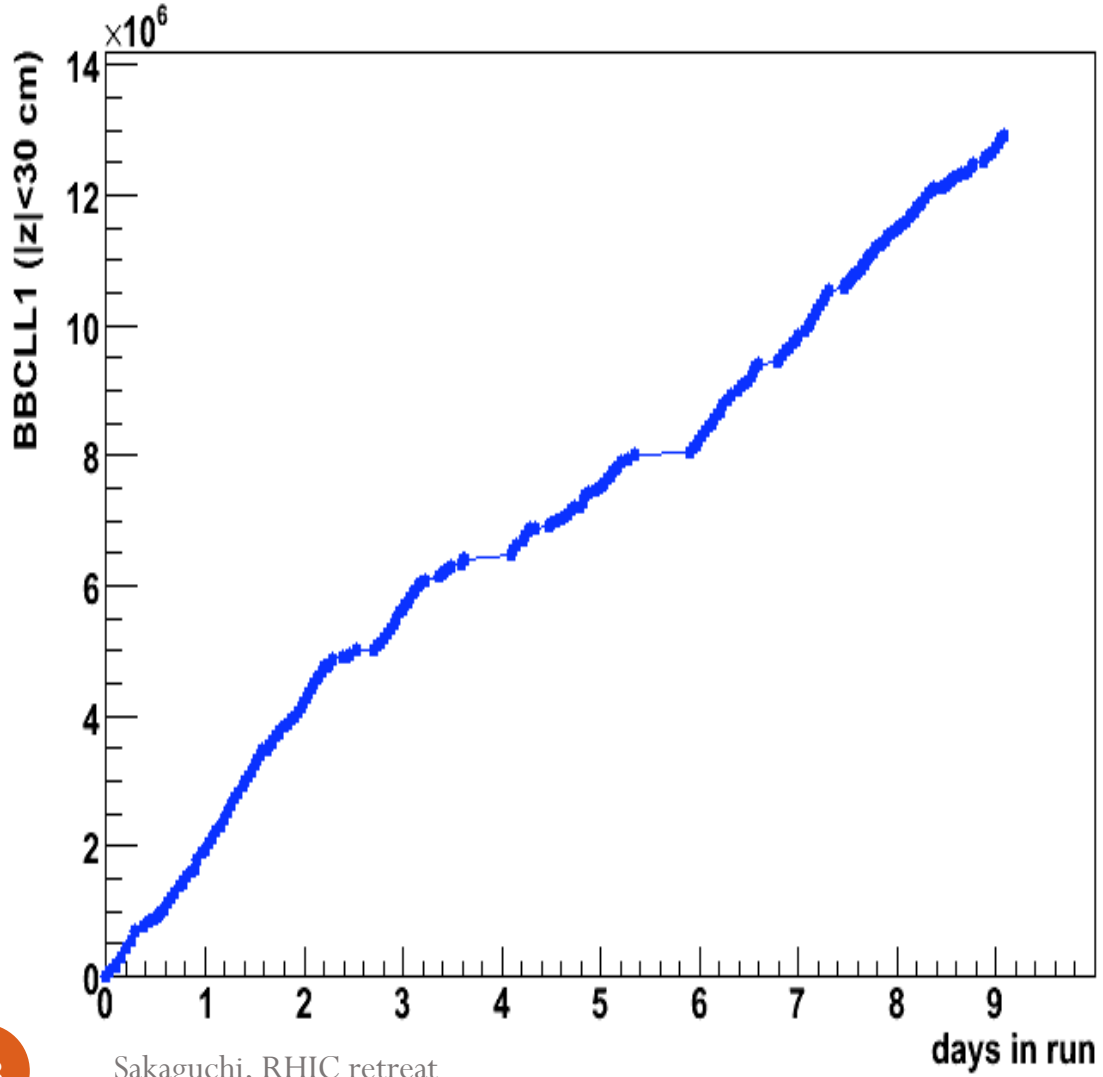
Integrated luminosity in 200GeV Au+Au

- 787 /ub out of 700 /ub (goal) in |z|<12cm





Statistics in 19.6 GeV Au+Au



Total BBC(|z|<30 cm)

13M Events

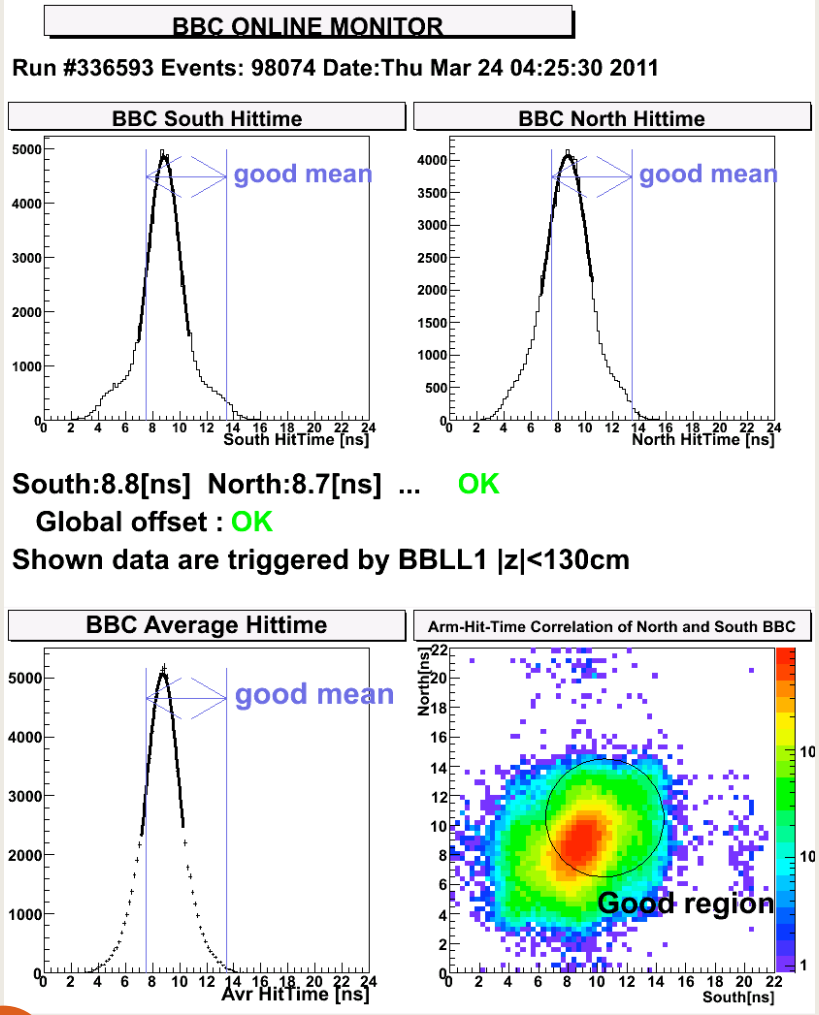
To be compared to

1.5M@7.7 GeV
250M@39 GeV

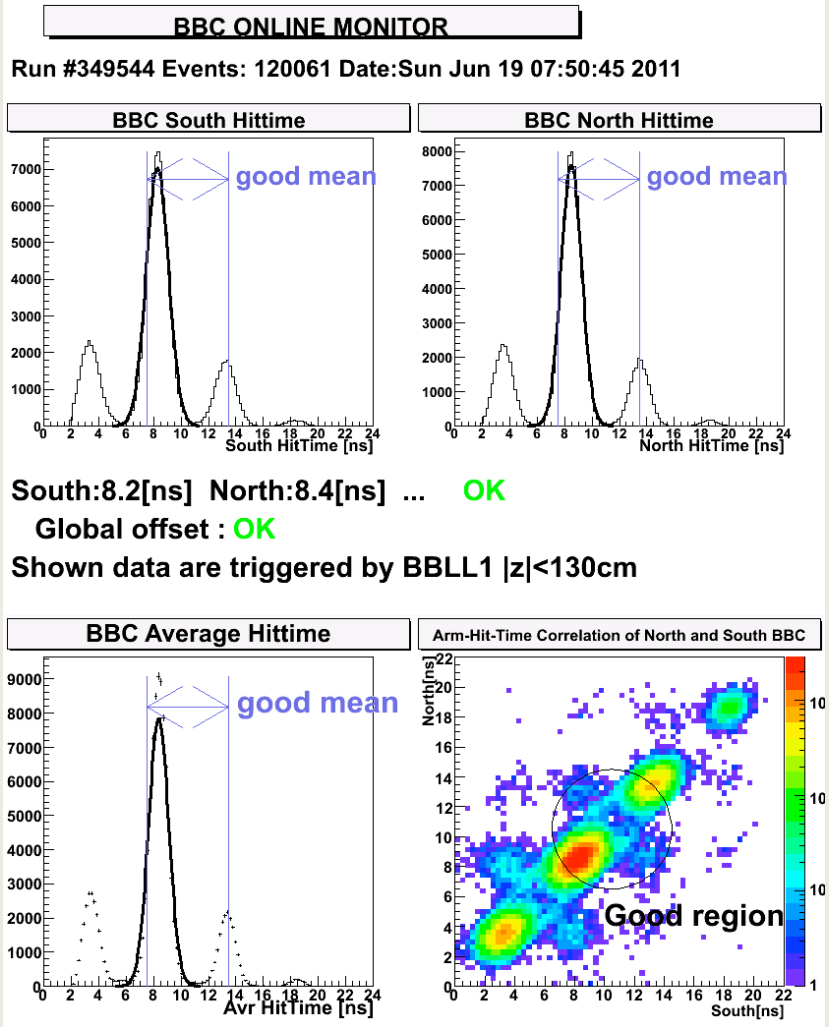
With the VTX in, recorded
~5M Events

Differences in Vertex Distributions between p+p and Au+Au

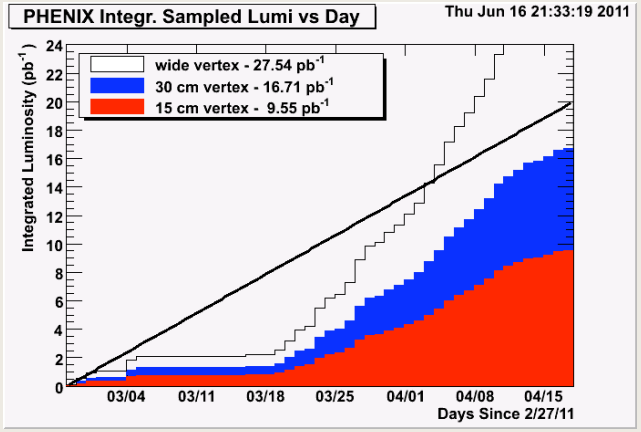
500 GeV p+p (R336593)

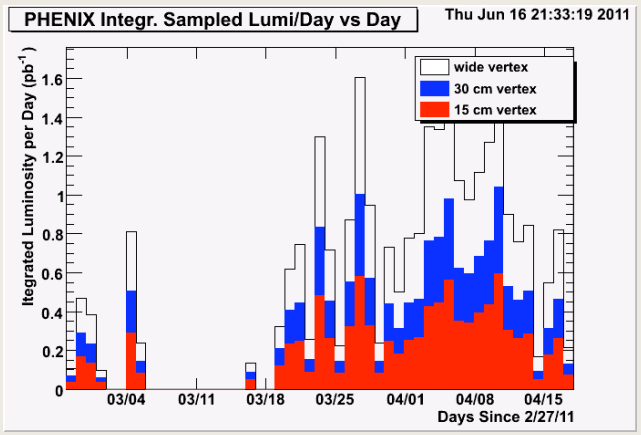


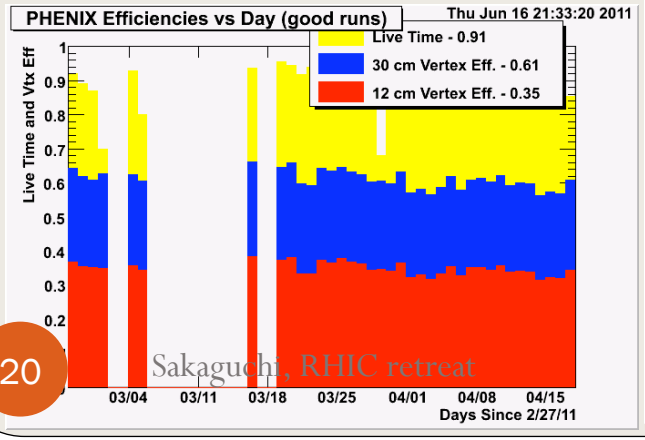
200 GeV Au+Au (R349944)



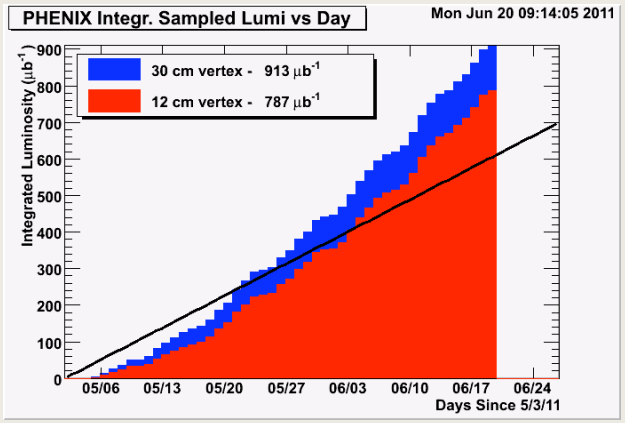
500 GeV p+p

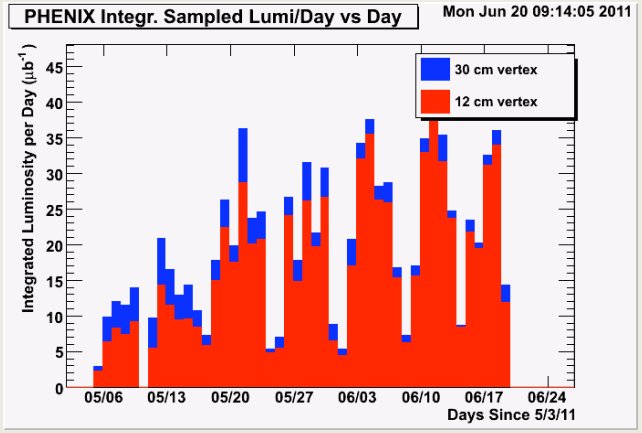


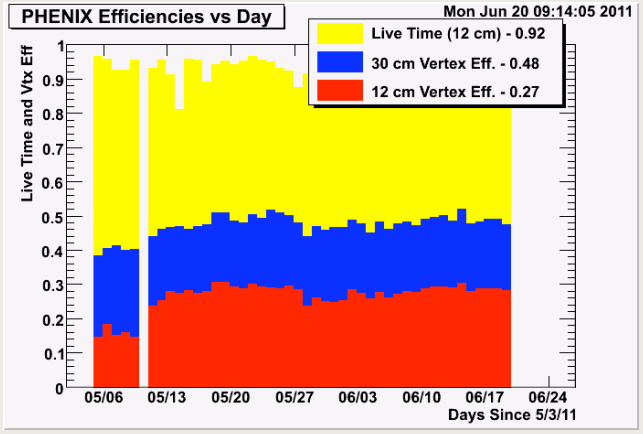




200 GeV Au+Au







PHENIX Uptime:

200 GeV Au+Au: 71%

500 GeV p+p: 62%

(not corrected for PHYSICS ON/OFF or for APEX days or Polarization measurements – i.e. just using ZDCNS to guage if physics is ON)

PHENIX Efficiencies	500 GeV p+p	200 GeV Au+Au
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